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Agricultural Depression.

AT a recent session of one of the schools of horticulture which are held in the different counties of this state under the Experiment Station Extension Bill, Professor Bailey departed from the customary order of procedure in these institutes and talked for a short time on "The Farmer's Trials." The unusual sluggishness of trade, commerce and all productive industries now prevalent, no doubt, warrants the discussion of topics of this sort on such an occasion, and although a consideration of such problems is foreign to the general purpose and spirit of these columns it may be worth while to call attention to certain conditions which have helped to bring about the existing agricultural depression in this country and in a large part of Europe. The trials of the farmer during the hard times have not been exaggerated, and he is driven into his present straits by poor prices and not by poor crops. Professor Bailey protested in the first place, however, against the prevalent idea that farmers are suffering more than other members of the community. In the general stagnation of business his profits have fallen like those of the manufacturer and every one else, and he is no worse off radically than his neighbor. There is no special road to renewed prosperity for the farmer unless the condition of the whole country is improved, and any legislation designed to aid farmers as a class would be not only ineffective, but pernicious. There are failures among tradesmen as well as foreclosure of mortgages on farms, and if tradesmen, as a rule, were as slack in their business methods as farmers mercantile failures would be much more frequent. The farms of New York state average from $3,000 to $5,000 in value, and with this capital invested prudent farmers are able to support their families, while it is doubtful if the same amount of capital invested in business would average as much. Professor Bailey added that under the Homestead Act, which, as we look back upon it, was a singularly unwise measure, great areas of free and railroad lands were taken possession of by numbers of emigrants who rushed into the west to make homes for themselves. The area of cultivated land increased at a much more rapid rate than the population grew, and a surplus of breadstuffs soon caused depressed prices. Since the greater part of our arable lands are now occupied, the population is growing more rapidly than the area of cultivated land is expanding, so that we may look for the time in the near future when the demand for food will, in some measure, equal the supply, and then the stringency will cease and the farmer may expect a greater reward for his labor.

Whether this prediction is fulfilled or not, the statements on which it is based are strictly true. Since 1890 the wheat production of the country has been more than twice as great as it was in 1870, and there is no doubt that these large crops, added to the millions of bushels which are exported from India and the Argentine states, have supplied the world with more wheat than it can eat, or, at least, more than it is willing to pay for, and to this it must be added that Russia, Hungary and Spain have multiplied their production still more rapidly, while Australia threatens to put millions of bushels upon the markets of the northern hemisphere. But this is only one factor in a great change which has been going on all over the world during the last half of the century. In agriculture as well as in manufactures, science with inventions, which come from increased knowledge, have so cheapened production of every sort that the world we live in is quite a different one from the world of the early years of the present century. Machinery has so multiplied the power of a single man to cultivate and harvest and transport crops that a bushel of wheat can be raised, harvested and turned into flour in the distant west at less cost than it could be raised a few years ago in the rich Wheat-fields of northern New Jersey or Pennsylvania, and it costs actually less to put flour into the New York market from Minnesota than it cost our fathers to carry it fifty miles. With sulky-plows and horse-cultivators, with cheap fertilizers and a knowledge of how to apply them, the market-gardeners and truck-farmers of Virginia and southern New Jersey, by the aid of rapid transit, can sell fresh vegetables at a profit in this city for less money than they could have afforded to sell them on their farms a few years ago. It is owing to this cheap transportation that the fruit growers of the east are compelled to compete with a thousand car-loads of fruit brought into this city every year from California. When early apples from Canada come into competition with late winter apples from Australia in the English market, and perishable fruits, like plums and peaches, raised in California, are sold in Liverpool, it is evident that the element of distance between the producer and consumer of agricultural products is practically annihilated.

Much truth is written nowadays about careless farming, but it is equally true that the farmer raises better domestic animals, that the vineyardist and orchardist produce better grapes and better fruits and more of them, that the market-gardener and truck-grower produce vegetables and small fruits of better quality and in much greater quantity than they did a few years ago. All this means that there is an enlarged market for our orchards and our vineyards, our farms and our gardens, and that modern science has enabled us to produce more on every acre and with less outlay than we once did. These are precisely the conditions which the cultivators of the soil were hoping and praying for fifty years ago, and yet they are the very conditions which are now helping to bring on the low prices of which complaint is made.

And what of the future? Very clearly, we may expect a still greater advance in agricultural and horticultural science and practice in the years next ensuing. Phosphates from rock and potash from the Stassfurt mines are already cheap, and even now it is announced that German investigators are on the eve of perfecting processes for drawing upon the vast stores of nitrogen in the air so as to make that most expensive element of plant-food as cheap as the others. Professor Nobbe, of Saxony, the distinguished plant physiologist, claims that he has produced on a commercial scale pure cultures of the different bacteria which are efficient in fixing the free nitrogen of the air in a form available

for plant-food, and has them for sale in small glass bottles. We have no means of estimating the value of the alleged discovery, but it has been considered of sufficient importance to be made the subject of more than one paper read before the Royal Agricultural Society of England. It is claimed that the soil can be inoculated with these organisms for the modest sum of $1.25 an acre, or the seed itself may be inoculated before it is sown quite as cheaply. Of course, it may be premature to place much confidence in this new method of securing fertility, but it has long been considered probable that some means of utilizing the stores of nitrogen in the air could be devised, and we may reasonably expect more wonderful discoveries since so many men of science are engaged in the experiment stations of the world in studying the laws of plant-life. Certainly it cannot be assumed that the further cheapening of food-production is an unmixed evil, and yet until the cultivators of the soil can adjust themselves to the new state of things this would certainly affect their prosperity. Synthetic chemistry has gone so far as to prophesy a time when fruits and vegetables can be produced at little expense in a laboratory from their original elements, instead of waiting for the slow processes of nature to perfect them. Even if this dream were realized it might be a blessing and not a curse, and yet it would bring temporary disaster upon the tillers of the soil.

We have little expectation that the time is at hand when man will cease to earn his bread by the sweat of his brow, but we hardly ought to complain if he earns it with less sweat than he once did. Certain it is that great changes in the lines we have indicated are in progress, and they cannot be arrested by any legislation which changes tariffs or affects the volume of currency. Professor Bailey is right in saying that if this depression continues, its first effect will be to refine the gold—that is, to drive out of the business all but the most skillful producers of crops. Meantime the farmer must be alert to adjust himself to his new surroundings; he must be content as manufacturers and merchants are to make a living and keep out of debt; he must do his work intelligently and avail himself of every new aid which science offers; he must keep his land in good heart, grow only as much as he can grow with some degree of profit, live quietly and economically, and then wait.

An Experimental Grove of White Pine.

MR. B. E. FERNOW, Chief of the Bureau of Forestry, referring to a grove of Pines with which I have been experimenting for more than twenty years, says in Garden and Forest (see p. 202):

Mr. Lyman has a growth of White Pine two-thirds of an acre in extent, fifty to fifty-five years of age, which he has thinned, so that in 1894 only 146 trees remained, or 223 to the acre. Most of his trees are over ten inches in diameter, at least sixteen of them are over fourteen inches, and the best measured 22.2 inches, the height being seventy to eighty feet. The calculated volume corresponds to a production of 7,185 cubic feet of wood an acre, which, under very careful practice, might cut 30,000, board measure.

In view of the vast value and importance of the White Pine and the rapidity with which a timber crop of it can be grown, even on land deemed almost worthless, I have been experimenting on a small scale to ascertain its rate of growth and the best treatment of the trees while growing. In this study I have been disappointed at finding so little aid from books. I want to find out how to grow a crop of timber on poor, cheap land as well as the best farmers in the Corn belt can grow a crop of corn. I have some four hundred acres of mixed young growth from twenty-three years to thirty-five years of age, and most of this has been left to nature. I have thinned some twelve acres of small White Pines and pruned some of them. The little grove referred to by Mr. Fernow is upon a deserted farm which I bought in January, 1870, and, as I remember, the first time I noticed it was a few years later. The trees are close by the highway, less than six miles from the large village of Farmington, less than a mile and a half from a railroad station, and fourteen, twenty and twenty-five miles respectively from the cities of Rochester, Somersworth and Dover; yet this grove with its 108 square rods of land could not probably have been sold at that time for much, if any, over one dollar, and, perhaps, for not over fifty cents. A man thinned the trees, receiving the thinnings as pay, and they made stakes, kindling-wood and, perhaps, a few light top poles for fence. They ought to have been thinned earlier. They were then left either five or seven years, which was too long, before they were thinned again. They have been irregularly thinned from time to time since, and the pruning has been equally irregular. Standing more than forty miles from my home, they have not been as well cared for as they ought to have been. They have no limbs within twenty feet of the ground, and the first twenty feet from the ground will make very good boards, worth, if cut now, at least twice the price of inch-thick box-boards. The larger these trees become the more clear lumber there will be in them, and its value per foot will increase with their size. I have other young Pines on the same farm which I have pruned, so that the logs from the first twenty feet of their bodies will be perfectly free of knots to within about two inches of their hearts, and these knots will be so small, free from blackness and sound, that they will scarcely be noticed in the boards. The cost of the several prunings of each tree will, I judge from my experience, amount to about one and a half cents. It would be a fast average growth with properly thinned Pines if they were two feet in diameter at seventy-five years of age. The most profitable number to the acre at this period of their growth I have not satisfactorily determined. Perhaps 130, or possibly 150, and the amount of lumber from 60,000 to 80,000 feet, board measure, with all of that from the butt logs of very superior quality and the remainder sound, with the ordinary amount of knots. The amount of wood, fencing, shingle stuff, box-board logs and timber cut out in thinning such a forest or plantation is immense. The saving in cost of getting lumber from such a clean forest, where every tree is a Pine fit to cut, instead of having to cut paths through trees and brush, and break them through deep snows to get scattering trees from among mixed growths is a very important item. For this and other reasons I prefer to have unmixed timber lots and no undergrowth.

Mr. Fernow and I do not agree as to the amount of timber to the acre upon my poorly cared for experimental grove (see page 202). In June, 1894, his assistant, Mr. Carey, measured the trees and sent his figures to Mr. Fernow, who, in a letter dated six days later, wrote, "practically you will not get more than 10.800 feet, board measure," on the 108 square rods, which is 16,000 feet to the acre. In the same letter he expressed the opinion that I ought to have four times as many trees on the plot as actually stood there.

From Mr. Fernow's estimate of 10,800 feet, board measure, for these 146 trees, or 16,000 to the acre, in his letter to me dated June 29th, 1894, he has raised his estimate in Garden and Forest, page 203, to 30,000 feet to the acre. At this ratio his next estimate would, I think, be too high, but nearer the true amount. Cutting one of the largest and one of the smallest of the trees growing on the inside of this grove, I had them sawed into inch boards with a thick circular mill saw, and the two made 500 feet. In my judgment these trees would be a fair average for all, and if so, they would saw out 54,750 feet to the acre. I reckon only 219 trees to the acre at the rate of 146 on 108 square rods. To be within bounds, I estimate 50,000 feet to the acre. In our Agricultural Report, written in February, 1895, I estimated the age of these trees at about forty-eight years. I now count it fifty years. The youngest are less than forty, but the larger one sawed had fifty-four rings in the low-cut stump, and, as I have learned by observation and by sowing Pine-seeds, that Pines start slowly, I think it likely that the seed started three years before it formed

the grain I found at the heart of the stump. I want to keep within bounds. Two good judges well acquainted with this grove think my estimate of the amount of timber too low. An acquaintance of mine lived on the farm with his father and helped mow the land where these trees stand in 1835, and there was, he says, no sign of a Pine there then, and he thinks the land was mowed several years after. That land so sterile and stony should ever have been mown shows the cheapness of labor and the poverty of its owner. Badly as this grove has been treated and neglected, it must be pretty safe to say that, besides all the wood, fencing, shingle stuff and timber cut out in thinning, it has at the rate of as many thousand feet of lumber to the acre as the trees average years of age, yet New York alone permits 867,000 acres of its territory, much of it undoubtedly better land for timber than mine, to lie in idle wastes and purchases many million feet of lumber annually from Canada. Why will not agricultural colleges or somebody teach the people how to increase the value of waste lands of New York, for instance, in a comparatively few years, a hundred of millions of dollars and add greatly to the beauty of her landscape?

Exeter, N. H. *J. D. Lyman.*

The Sand Dunes of Northern Indiana and their Flora.—IV.

CNICUS PITCHERI is an herbaceous plant which early gains a foothold in the sand. It is very singular in appearance, the densely hoary stem and leaves forming a pale object resting on the sand. It is usually isolated, the branching stem when in flower a foot or two high, but with a root going downward several feet. As an early companion we shall find Solidago humilis, particularly the variety Gilmani, with virgate stems sometimes three feet or more in length. Another common Golden-rod is S. speciosa, var. angustifolia, the handsomest of all that appear on the dunes, with its long panicle of bright yellow flowers, with S. nemoralis, in great variety of individual forms, equally at home. Much less common are S. rigida and S. tenuifolia, and S. cæsia comes in where shade is found. The Asters do not number many species, but the drier sands make a home congenial to such kinds as A. linarifolia, A. ptarmicoides and A. multiflora. A. azureus is frequent in the copses and open woods, and on more closely wooded hills or shaded spots the arrow-leaved and the heart-leaved Asters are found. Kuhnia eupatorioides appears, having more slender stems, narrower and less dentate leaves and fewer heads than in the form growing on the prairies. Liatris scariosa and L. squarrosa are conspicuous with their bright, showy spikes, handsome here and worth a place in any garden. Artemisia caudata flourishes on the driest banks, a plant with finely cut, but dull foliage. In the spring and early summer the little annual Krigia Virginica sometimes makes dense beds of yellow flowers on the sunny hillsides. It is heliotropic in habit, each little head of flowers bent upon the stem to face the sun. Helianthus divaricatus is the most common Sunflower. It is generally low and slender, one and a half to three feet high, often with an unbranched stem crowned by a single head. H. occidentalis is native to such places. Lepachys pinnata, with long drooping rays of pale yellow, is frequently seen on the open hillsides. Rudbeckia hirta, Coreopsis palmata, Prenanthes aspera and several of the Hawkweeds are also present. One of the earliest plants to appear in spring is the little Everlasting, Antennaria plantaginifolia, covering some sterile knoll with silky stems and leaves.

The Birdsfoot Violet is the first of the genus to bloom in spring. It is very abundant in most sunny spots, delighting in a south exposure. Its bulbous root fits it to withstand the heats of summer, and in early autumn, after a warm rain, it is frequently seen putting forth new leaves and flowers. It is the only representative of the order, except an occasional Arrow-leaved Violet, or sometimes a Blue Violet. The yellow, fugacious flowers of the Frost Weed, Helianthemum Canadense, are very pretty for the few hours they last, and are common in such spots as the Birdsfoot Violet frequents. The most abundant cruciferous plant is Arabis lyrata, its white flowers seen everywhere in open spots throughout the woods in early spring. One of the Whitlow Grasses, Draba Caroliniana, sometimes accompanies it, coming into bloom some years in March, and a small, hairy Forget-me-not, Myosotis verna. Later in the season we find Arabis hirsuta and the Sickle-pod, A. Canadensis, usually in more sheltered places or in the shade of trees. With them may be associated two of the Galiums, G. pilosum and G. circæzans, their shapely, symmetrically arranged leaves always making them attractive. The Early Crowfoot, Ranunculus fascicularis, delights also in the dry hills, especially in spots which may have become a little grassy. The cylindrical heads of Anemone Virginiana and A. cylindrica are often seen peering out from the low bushes on the slopes, and in some wooded places we meet with the Wind-flower, A. nemorosa, and with Anemonella thalictrioides. Both forms of Hepatica also occur. The handsome flowers of Aquilegia Canadensis are abundant in their season, the plants being sometimes massed, but oftener scattered over the sides of the steeper slopes. It is usually accompanied in such spots by the Harebell, Campanula rotundifolia.

Though the Pulse family are not largely represented by species, some are very numerous. This is especially true with the Wild Lupine, though it is most abundant on the lower sand reaches where the timber has been partially removed, and where the showy flowers are seen in May and June almost covering the ground by the acre. Tephrosia Virginiana is common, as well as Lespedeza capitata and L. polystachya. The Lead-plant, Amorpha canescens, is also found, and several kinds of Desmodium. Of the Pink family, we may see Silene stellata and antirrhina, and the Sandworts, Arenaria Michauxii and lateriflora. Of Polygala, we find P. polygama, P. verticillata and P. Senega. Herbaceous Rosaceæ are mainly represented by the Strawberry, Fragaria Virginiana, and some of the Cinquefoils, Potentilla Canadensis, arguta and argentea. Of Saxifrages, Heuchera hispida occurs, and on shaded hillsides Mitella diphylla. The Carpet weed, Mollugo verticillata, has come in, and does well on the open sands or along the woodland paths, its pretty whorls of smooth leaves lying on the sand, making a welcome addition to our native flora. The soil does not seem very congenial to the Umbellifers, and they are rather rare. We meet with Pimpinella integerrima, Zizia aurea, and where the ground is more generous in the supply of leaf-mold and has been long undisturbed, the Sanicles and Cryptotænia Canadensis will grow. Even the Partridge-berry, Mitchella repens, creeps about sometimes in the shade of trees in such spots. Aralia hispida is most at home of the family it represents, but the Wild Sarsaparilla is found in the richer woods, and the Spikenard is seen at times on the protected hillsides.

One of the most frequent and characteristic plants of open, sunny spots is the Prickly Pear, Opuntia Rafinesquii. Its clumps or beds of stems are very showy in early summer with their profusion of yellow flowers, and quite attractive in autumn when well provided with purplish fruit, which thickly studs the edges of the flattened segments, erect or curving upward when in their active stage. In similar places the small white flowers of Euphorbia corollata are seen very abundant and effective, because of their numbers. It often becomes a hairy plant upon the dunes. With these are associated Œnothera rhombipetala, the characteristic Evening Primrose of the sand region, though Œ. biennis is also found; the gay Butterfly-weed, Asclepias tuberosa, rather common, and bearing not only the usual bright orange flowers, but those that are nearly red, and the most slender of our Milkweeds, A. verticillata, with fine linear leaves. The Green Milkweed, Acerates viridiflora, finds a place, and on shrubby hillsides and in open woods

the Dogbane, Apocynum androsæmifolium. Of Monardas we have the Wild Bergamot and the Horse-mint, the latter one of the most abundant plants of the more open grounds, appearing in patches, thinly covering large areas. Lithospermum hirtum and L. canescens are found scattered everywhere, and Phlox pilosa is rather common.

The Toad-flax, Linaria Canadensis, a low annual, or more often a biennial here, shows its delicate blue flowers in May, and is associated with the Dwarf Dandelion on the hillsides. Later in the season another small annual, Polygonella articulata, takes a place beside it, but is more widely disseminated on the dunes, flourishing in the shade and along the sides of roads and paths. Rumex Acetosella has come in abundantly in such localities, and occasionally Chenopodium Botrys. Comandra umbellata appears on the sparsely wooded hills. In the dry open sands we find the Purslane family represented by Talinum teretifolium, with beautiful, but ephemeral, pink flowers and curious cylindrical leaves. Either seeking partial shade or by the borders of wooded areas are found some of the large Gerardias, with handsome foliage and showy yellow flowers—G. pedicularia, flava and quercifolia. The common Figwort, Scrophularia nodosa, var. Marilandica, may also be seen in the sands. Very common in the shade, especially of the Pine-clad hills, is the Cow-wheat, Melampyrum Americanum. In such places we come upon the Pyrolas and Pipsissiwa, Chimophila umbellata, and in the hollows one may occasionally see its congener, C. maculata. In these dry, basin-like depressions, or on the bases of the surrounding slopes, the Mayflower, Epigæa repens, occurs, but does not seem abundant till we come near Michigan City. Commelina Virginica does well on the sunny slopes, a companion of Tephrosia and the New Jersey Tea. Tradescantia Virginica is sometimes abundant, and quite frequently takes a low, hairy form. Climbing the trees or running over the bushes, with stems sometimes ten to twelve feet long, is Smilax herbacea. Luzula campestris represents the Rush family on the hills, though the ubiquitous Juncus tenuis creeps in beside the pathways in more favored spots. Plants that seem much out of place and serve as good examples of the strange association of species on the dunes are Mianthemum Canadense and Smilacina stellata. The two-leaved Solomon's-seal seeks cool, shaded places, and, though abundant in the deeper hollows, is not common on the hills, but the Smilacina is not only frequent in the shade of trees, but often very abundant on the fresh-formed high dunes near the lake-shore, where it is associated with the Sea-sand Reed and similar plants.

Space fails to speak of the Sedges which constitute the larger part of the flora of the contiguous wet lands, several species of which are represented on the ridges, or of the many cryptogamous plants which add color and variety to these sandy slopes and ridges. Of course, this list of the dune flora is not meant to be exhaustive. It is purposely limited to the higher ridges, and only those features have been kept in view that were best adapted to show its chief characteristics and varied nature.

Chicago, Ill. *E. J. Hill.*

Plant Notes.

Rhodódendron (Azalea) Indicum obtusum album.

AZALEA OBTUSUM, which Maximowicz, the monographer of the eastern Asiatic Rhododendrons, considered a variety of Rhododendron (Azalea) Indicum, was found by Fortune in a garden in Shanghai and introduced by him into England in 1846. It is a dwarf, much-branched shrub with slender branches, small evergreen obovate or oval leaves slightly ciliate on the margins, and from one to three-flowered clusters of small flowers, with brick-red corollas, and exserted stamens usually five in number. This plant usually proves hardy in English gardens, although it suffered at Kew during the severe winter of 1894-5, but we are unaware that it has ever been tried in the open ground in this country. The white-flowered form, of which the photograph of a flowering branch is reproduced in our illustration on page 395 of this issue, appears to be rare and its origin is unknown to us. For more than thirty years, however, it has been growing in Professor Sargent's garden at Brookline, Massachusetts, where there are several specimens; these are planted out during the summer with the collection of Indian Azaleas, potted before frost, and grown in a low temperature during the autumn. With the aid of a little artificial heat the plants are in flower by Christmas, and it has been found impossible to retard their flowering until spring. The tendency of this plant to bloom early makes it possible to bring it into flower at the beginning of the year without hard forcing, and the flowers therefore last much longer than those of varieties which bloom late and require a high temperature to induce their buds to open. This Azalea, moreover, is a long-lived plant; its habit is compact; its light green leaves remain for two or three years on the branches; it never fails to cover itself with pure white flowers; and when white-flowered Azaleas are needed early in the winter it can be commended.

Begonia gracilis, var. Martiana.—This Mexican plant, usually known in gardens as Begonia Martiana, is well worth growing for its beauty and distinctness. Like the majority of the bulbous Begonias, it flowers in summer and finds its best environment under shelter, where its tall, succulent stems and delicate flowers will have protection from the elements. Strong plants have a gradually expanding stem, usually unbranched, and furnished rather sparsely with small half-heart-shaped green leaves, slightly hairy. Normally they have a single stem, but if this is checked by bending or breaking it throws off side-shoots. The flowers are borne from the axils of the leaves on short peduncles, and in good forms approach two inches in diameter. They are round, slightly cupped and of a most delicate clear pink color. As the stem lengthens it is studded at the top with flower-buds, which open in succession as it grows in height. It forms bulblets in the axils of the leaves, which may be used in propagation, and are apt to perpetuate the species in a greenhouse not too carefully kept. The round white-skinned bulbs are also less subject to decay than those of other tuberous Begonias, except B. Evansiana, which is well known as a reliable Begonia under very adverse conditions. Bulbs of B. Martiana have been found to survive in very cold wet soil in a greenhouse often just at the freezing-point, and it is barely possible that the bulblets might perpetuate the species out-of-doors, as do those of B. Evansiana, which is the only species yet proven hardy in northern gardens. The maintenance of B. Evansiana is not always, however, entirely dependent on the bulblets, as the small bulbs, at least, are usually frost-proof. How long they continue in that condition does not seem to have been observed, but it is probable that they scarcely survive beyond one or two seasons under ordinary hard conditions. Bulbs of all tuberous Begonias are short-lived, usually reaching the end of their usefulness in about three years. These two species are not as big-flowered as the hybrid Begonias which for a time seemed to every one great marvels, but they rival any of the family in dainty beauty.

Cultural Department.

An Outbreak of Asparagus Rust.

THERE has been an unusual development of rust upon Asparagus-plants, in some of the middle states at least, and this is so alarming to the truck-growers of New Jersey that Professor Halsted, of the Experiment Station of that state, has sent out to the newspapers a special bulletin on the subject. The directions are as valuable for those who grow Asparagus for home use as for those who grow it for market, and we give the essential matter of the bulletin below:

Appearance of the Field.—When an Asparagus-field is

badly infested with the rust the general appearance is that of an unseasonable maturing of the plants. Instead of the usual healthy green color, the field has a brownish hue, as if insects had sapped the plants or frost had destroyed their vitality.

APPEARANCE OF THE PLANTS.—Rusted Asparagus-plants, when viewed closely, are found to have the skin of the stems, both large and small, lifted as if blistered, and in the ruptures of the epidermis dark brown spots are readily seen. These brown dots or lines are of various sizes and shapes, and remind the close observer of similar spots in the broken skin of stems of grains and grasses and of the leaves of Corn, also due to rusts, but not the same kind as that of the Asparagus.

NATURE OF THE RUST.—The Asparagus rust is due to a fungus (Puccinia asparagi, D. C.), that is, a minute plant consisting of microscopic threads which grow through the substance of the Asparagus-plant, taking up the nourishment that is needed, and finally break through the surface to bear the innumerable brown spores that give the dark color to the spots on the Asparagus skins. This is the last stage in the development of the rust fungus, and as such remains over the winter. When the warm, moist weather of spring and summer comes, the spores above mentioned germinate, and a new lot of Asparagus-plants may become infested.

TREATMENT OF INFESTED FIELDS.—There are two general methods of checking the rust, namely, by destroying the spores and by preventing their growing upon, and getting a foothold in, the substance of healthy Asparagus-plants. The rust fungi are among the most difficult to check by protecting the plants they feed upon with fungicides like Bordeaux mixture, etc., sprayed upon them during the growing season. While something may be hoped for with the spraying-pump in July and August, the chief method of eradication lies in the destruction of the spores this fall. This can be done in a very simple and effective manner by carefully gathering all the parts of the Asparagus-plants that are above ground and burning them. It would be a waste of time to stack the tops and leave them to natural decay; and to place them in manure heaps would be still worse. The only safe thing to do when a serious enemy like this is in the Asparagus-field is to burn the plants even to the last scrap that can be gathered up. Let this be done at once, for any delay means the breaking up of the brittle, rusty plants and a generous sowing of the spores upon the ground. If the fire could go over the whole field and burn all the small as well as the large pieces, that would be the best of all. This autumn burning should be done by every Asparagus grower, even if the rust is not yet seen by him. This enemy may become very serious if thorough measures are not taken at once and by all who are engaged in Asparagus culture.

Fig. 52.—Rhododendron (Azalea) Indicum obtusum album.—See page 394.

Quality in Tomatoes.

IT is discouraging to those who are trying to improve our garden vegetables that the popularity of vegetables is much more dependent upon appearance than the quality. This is particularly noticeable in tomatoes, and the sort which pleases the eyes, even though not of best quality, is the popular variety. Many of the observers at our experiment stations seem to be influenced in the same way, and their reports would make it appear that the ideal tomato is perfectly round with no sutures, the interior made up with as many and thick partition-walls as possible, and that the fewer seeds and the less pulp they contain and the more solid the fruit, the better. Now, if one takes out a section of the interior partitions of a tomato so carefully that it receives no flavor from the pulp or exterior wall, it will be found that this is a mass of cellular matter without a particle of flavor. The flavor of a tomato is chiefly in the pulp, though there is usually a little in the exte-

rior walls. The seeds are useless for food, and the fewer and smaller they are the better. But we can have no pulp without seeds, and it is the pulp, not the partition-walls or flesh, which gives quality to the fruit. If each seed was in a cavity by itself and surrounded by pulp this would be the most favorable structure for the highest quality. Tomatoes in which the interior is broken up into many cells are desirable rather than because of the thick partition-walls or flesh. Again, it is usually the case that the thicker and more solid the pulp the better the flavor. Thin pulp is always acid and harsh in flavor.

The interior, then, of the ideal tomato should be made up of a great many cells separated by thin—not thick and fleshy—partition walls, and filled with thick pulp surrounding small seeds, only the outer walls being thick. There should be no core or hard centre, and, above all, the flavor should be a rich, mild, fruit-like acid or subacid; there is a great difference in varieties in this most important quality. Usually the skin is removed before the fruit is used, and this can be most easily done from a perfectly smooth, globular fruit. But a somewhat flattened globe or an oval-shaped fruit is far more attractive, and, if perfectly smooth, it is practically as easily prepared for use. The stem of a tomato is set in a basin, and the deeper this is the greater the likelihood of the fruit having the objectionable hard centre or core, so that in the perfect tomato it should be as shallow as possible. As to color, depth and brilliancy, evenness of distribution both on the surface and through the pulp and flesh, and its permanency in cooking, are important characteristics. The color, whether purple, deep red or yellow-red, is of itself a matter of taste. I have never seen a purple tomato in which the flavor was first-class, it always having a sharp, harsh, metallic-like acid taste far inferior to the rich fruit-like acid of the red sorts. For this reason I think the ideal tomato will be a red one.

A tomato is always at its best as to quality when it is fully ripened on the plant. It may look as well, or even better, if picked before fully ripe and ripened off the vine, but such fruit lacks in quality. To have the best canned tomatoes, fully ripe fruit should be sealed up in the cans within three hours of gathering. There is no fruit in which the highest flavor is more quickly lost, and if housekeepers will try the experiment of putting up perfectly ripe and fresh fruit of a fine-flavored variety, they will appreciate the advantage over partially ripe fruit which has been off the vines for days.

Detroit, Michigan. *Will. W. Tracy.*

The Mills Grape.

AMONG the one hundred and sixty-seven varieties of Grapes in the Station vineyard here, none is more interesting than the one named Mills, and said to have been produced by crossing Muscat Hamburg and Creveling. As Creveling, though of uncertain origin, undoubtedly contains some Vinifera blood, this would make Mills more than half Vinifera, which its characters amply attest. It is distinctly tender in this climate and needs winter protection when the weather is at all severe; besides which it is an easy prey to black-rot and mildew, unless protected from them by spraying. With these precautions, however, the vine is a moderately strong grower and the foliage quite handsome.

But the most peculiar characteristics of the variety are found in the fruit. The bunches are large, compact and quite heavily shouldered; berry large, slightly oval, jet-black and covered with a thick bloom; flesh very meaty but juicy, with a sprightly flavor, and the skin so thick and tough that the bunches may be roughly handled without injury. Indeed, the skin is so tough that it is quite difficult to bite through it, and the berries adhere to the peduncle with corresponding tenacity. The seeds are large, with elongated beaks, and the chalaza near the end, as is characteristic of Vinifera hybrids. While it ripens soon after Concord, its season is much longer, and it will remain on the vine in the fall, protected only by a common manilla sack, until freezing weather, and is then at its best.

Although it will probably never take rank as a market sort, its peculiar characters, delightful flavor and keeping qualities should recommend it for amateur collections.

Manhattan Agricultural Exp. Station, Kansas. *F. C. Sears.*

Rose Gardens for America.

I HAVE read Mr. Watson's description of Mr. Robinson's garden of Tea Roses and I agree with the editorial note that no single plant can take the place of a Rose in furnishing flowers continuously all summer long. To the question whether we can have a Rose garden like this in America I answer yes, and no.

America is a large country, and south of the Ohio and in the Pacific states there are thousands of localities where bedding Roses luxuriate, but in our northern and central states it is not every garden, by any means, that will grow Roses, though a little thought as to situation, protection and soil will often show the enthusiastic rosarian a "rose-pocket" which would have escaped the eye of the ordinary flower grower. Good drainage under a Rose bed is an absolute necessity; the soil should be a rich clay; and in our hot, dry summers a good mulch, preferably of old strawy manure, must be supplied if we would have growth and bloom; without the mulch and a free application of water, our Rose-plants will simply stand still and wait for cooler weather.

Our north-central states this year have enjoyed a summer long to be remembered; rain has fallen every few days, and it has been a delight to watch the smiling response of the flowers. Those who were fortunate enough to have planted Roses this season have been bountifully rewarded with rapid growth and an abundance of bloom, and the strong, stocky growths assure us of continuous bloom till frost.

Now, can we keep these bushes over for another year, and are they preferable to young, fresh plants? They are decidedly to be preferred to young stock, and good bedding varieties can be protected with proper care. The most perfect protection that I have ever seen used is a strip of sod set on edge in circular-wall shape about the plant, leaving an enclosure about one foot in diameter; turn the grassy side out and fill in the enclosure about the stems with loose soil. This will not injure the stems, as straw, leaves and other coverings are apt to do if the winter proves a wet one. Prune away the dead wood in the spring and you have a strong, stocky bush ready to begin work.

The hybrid Teas having a preponderance of Tea blood are the American Rose growers' surest friends, for in them we have strength and hardiness combined with perfect freedom in bloom; this will keep our matchless La France and its near relatives, Augustine Guinoisseau (white), Duchess of Albany (red), Madame Veysset (striped), all of which are now becoming numerous, quite at the head of the list of outdoor Roses. Our experience with Belle Siebrecht and Kaiserin Augusta Victoria marks them as close followers, while Grace Darling, one of the finest Roses extant and showing little trace of hybrid blood, will charm every beholder. We would complete the list with pure Teas, as follows: Papa Gontier, Etoile de Lyon, Marie Van Houtte, Madame Joseph Schwartz, Maman Cochet, Comtesse de Labarthe, Madame Welche and Mrs. Pierpont Morgan, the last abundantly worthy of a trial in the garden; and all the while we are grieving for a score of other rarest beauties which any "list of twelve best bedders" must naturally exclude.

Chicago, Ill. *E. J. Hill.*

Rattlesnake Plantains.

WATKIN'S GLEN is a beautiful and somewhat famous gorge situated at the head of Seneca Lake, New York. The flora in the dark and moist places is for the most part, of course, limited to a few species of Ferns and Mosses, which grow luxuriantly. After a time the eye tires of the sameness, and one longs for a bit of color to liven the sombre green. On a recent visit to the Glen, after I had become tired with the continuous climbing, I was delighted to see a tiny spray of delicate white flowers in the midst of a bed of Moss which grew on a ledge of rock at my side. A glance showed that it belonged to the Orchid family, and I carefully lifted my treasure, packed it in moss in the lunch-basket and carried it home. The next morning it was transferred, together with the moss in which it grew, to a small pot. Though this was over three weeks ago, the scape still retains its flowers nearly as fresh as when it was first found, and the buds at the end have matured. Evidently the plant is as much at home as it was in its natural state.

The little plant is one of the Rattlesnake Plantains, Goodyera repens, the smallest species of the three which grow wild in this region. The few small leaves cluster at the base of the plant and the scape arises from the centre of the cluster. The largest of the leaves of this specimen are not more than an inch and a half long by three-fourths of an inch broad; the upper surface is beautifully reticulated with white, and this, no doubt, gave rise to the snaky part of the common name, while the shape of the leaves at once suggests a miniature plantain. The bracted scape is about six inches long, bending slightly in a graceful curve, on one side of which the flowers are loosely arranged. The flowers are pure white, tiny almost to insignificance, yet beautiful in their simplicity. G. pubescens is considerably larger in all its parts, with leaves

more beautifully netted, the flowers more closely arranged on the spike and not on one side only.

These little Orchids are airy and graceful, and though not often seen in cultivation they will do well when grown in suitable quarters. From the fact that they thrive in such moist and shady places they would seem to have special merit for use in north windows and should be better known.

Geneva, N. Y. *W. P.*

Ophiopogon Jaburan variegatum.—For many years after its introduction, and, indeed, even at the present time, this beautiful Japanese garden plant, in common with others, was considered tender, and always classed with greenhouse plants. There is no reason why this should be so, as far as its utility and beauty are concerned, and when once the hardiness of any plant is assured, its proper place is in the garden. While the genus Ophiopogon is widely removed from the Grasses, nevertheless, as a margin to a bed of decorative Grasses, no more fitting plant could be used. It is perfectly hardy; more so, indeed, than some of the Eulalias and Arundo donax, which in this latitude need a good protective covering in winter. In addition to the beautiful variegation of the foliage of this Ophiopogon, it carries at this season a profusion of bright blue flower-spikes that are attractive in contrast with the creamy white striped foliage. This plant is often seen under the names of O. spicatum or O. Japonicum, both of which are totally different plants, and rarely, if ever, seen in gardens. The intense violet-blue flowers are typical of this variety, which may safely be considered the best in the genus. The generic name is somewhat unusual, and is a translation of the native name, which signifies serpent's beard. To propagate it, it should be lifted in spring and carefully divided. The roots have tubercles similar to Hemerocallis, and are easily separated; the crowns are first divided, and then the roots.

Pennisetum Ruppellianum.—A few weeks ago this new ornamental Grass was described, and its free growth from seed the first season was noted. As was promised by the introducer, the spikes are deep red-bronze, quite remarkable among Grasses that bear spikes and a striking contrast to Pennisetum longistylum, the better-known species, which has spikes of nearly white flowers, and the new variety has the same graceful, long, narrow, green foliage, in dense tufts, as the old form. We find it is easily raised from seed and flowers profusely the first year. In this particular it is in striking contrast with most of the annual ornamental Grasses, with the seeds of which we have had but poor success, probably because first-class seeds are not kept by dealers, owing to lack of demand on the part of cultivators.

South Lancaster, Mass. *E. O. O.*

The Loganberry.—Last July I had an opportunity to taste this new berry and am exceedingly pleased with it. It has the form of a blackberry and a solid core like that fruit. The color is red and the flavor like that of a raspberry, but more acid. Eaten with sugar it is very delicious. The plant has a rambling growth and its fruiting season here extends over three months or more. Some of the berries were one and a half inches long. It is generally known that the original plant was a chance seedling of the Aughinbaugh Blackberry, probably fertilized with pollen of some red Raspberry of the French type.

Strawberries.—I have for the last two seasons been experimenting on a small scale with Strawberries and am much pleased with the Arizona Everbearing. This is of good size, fair flavor and a rather light red color. The plant bears a full crop in May and moderately all the rest of the summer and autumn. It is of compact growth, forming immense stools, which appear in the distance like small hills of potatoes. In the moist atmosphere of the east the growth would probably be much stronger. I would recommend it for trial there, as possibly it might produce fruit for a longer period than ordinary varieties. Another good variety here is the Marshall. This proves a good grower, with foliage and fruit standing well up on long stems. The fruit is of good size, delicious flavor and of the brightest red color. It continues in bearing three or four months, and in favorable seasons probably longer.

Los Angeles, Cal. *E. D. S.*

Caryopteris mastacanthus.—I lately saw some plants of this beautiful shrub grown from seeds imported direct from Japan. Growing alongside them were some plants purchased under the same name from nurserymen in this country, yet the two were as dissimilar as possible. The leaves of the seedlings were much larger and ovate-oblong in outline. The flowers were of a deeper blue and in larger clusters, and in full bloom September 13th, while the other plants had hardly commenced to flower, and the leaves were lanceolate-elliptic in outline. I have known the plants sent out as Caryopteris mastacanthus by nurserymen almost since its introduction in this country, but I have come to suspect that some at least of the plants sent out by nurserymen are examples of C. Mongolica, and that I had not seen the true C. mastacanthus until I saw these seedlings.

Botanic Garden, Northampton, Mass. *Edward J. Canning.*

[The plants of Caryopteris mastacanthus in the Arnold Arboretum have been propagated by cuttings from one which originally came from Herr Max Leichtlin, and, perhaps, most of the plants in this country have been propagated in this way. Persons in doubt as to whether they have the true species can readily identify it by comparison with the figure and description in *The Botanical Magazine.* —ED.]

Correspondence.

Notes from Santa Barbara.

To the Editor of GARDEN AND FOREST:

Sir,—Bignonia venusta has begun to show bloom much earlier this year, while its regular season extends from September to May, during which period the roofs of many homes are literally covered with its rich orange clusters, making a display not easily forgotten. In showiness and in vigor of growth it finds a worthy companion in Solanum Wendlandii, which bears in the greatest profusion its grand bunches of Wistaria-colored flowers from May to December. Another highly commendable climber proves to be the variety Grandiflorum of the old Solanum Jasminoides, producing all the year round numberless clusters of pure white Jasmine-like flowers, most useful also for cutting. Lately I happened to see a plant of this Solanum which had taken possession of a huge clump of Achania malvaviscus, the bright scarlet erect flowers and emerald-green leaves of the latter struggling to peep out of the snowy mass of their invader, a truly magnificent, although unthought for, combination.

Solanum Seaforthianum, so much advertised of late as S. azureum, has proved here rather below expectation, as far as freedom of blooming is concerned, while it has no right to be called azure blue. Neither can this color be claimed for the not less boomed Caryopteris mastacanthus, rather a pretty plant altogether, with a misty appearance, owing to its grayish green foliage and numerous whorls of pale lavender flowers. True-blue flowers are scarce, hence the tendency of floating under blue colors what honestly ought to be called shades of lavender, purple or violet color. In the line of light blues I do not know of any better than the old Plumbago Capensis, quite at home here and blooming splendidly in the driest places. Strange to say, the same resistance to drought is possessed by the humbler, but not less desirable Plumbago larpentæ, lately rebaptized as Ceratostigma Plumbaginoides. It is really a pity that pretty plants have to bear such fearfully long names. Quite promising and much admired, because a true blue and such a free bloomer, appears to be Jacquemontia abutiloides, introduced from Lower California. This is a vigorous climber; the stems and obcordate leaves thickly beset with minute silvery hair; the flowers azure blue, three-quarters of an inch in diameter, opening quite flat and standing well out of the foliage on long pedicels, generally bifurcated, each bearing twelve to fifteen flowers, two and even three of them opening at the same time, from morning till about four o'clock. This is the hour when the fluffy, pure white, sweet-scented flowers of Calliandra portoricensis expand every day, as if by magic, while at the same time its Mimosa-like leaves go quietly to sleep. Among newly introduced plants that have bloomed for the first time this year, Bauhinia calpini, from Natal, is very striking, its brick-orange flowers being produced in clusters of ten to twelve, several open at the same time, each of them two inches across, and literally covering the horizontal spreading branches. Next to this, Bauhinia diphylla, from India (?), has just begun to open its snowy white flowers, much larger but not as plentiful as the preceding. Several more species of the genus Bauhinia are likely to bloom before long; many of them are sure to prove a welcome addition to the gardens of our southern states, for their curious bilobed leaves and showy flowers having such a wide range of color.

Eriogonum giganteum, a native of Santa Catalina Island, is in full bloom, and well deserves its name, the whole plant covering not less than ten feet in diameter, each branch or inflorescence being two to three feet across, the innumerable minute

flowers white, with a slight tinge of red. It will be a fine thing to grow as an isolated specimen on a lawn, and very good also for cutting, and especially for the so-called "Mackart bouquets."

Leucophyllum Texanum is also a very valuable shrub, both for its graceful silvery foliage and pretty purple flowers, and well deserves to be spread in our gardens. Concerning color in foliage, while our native Californian trees cannot compete, to be sure, with the exuberant display of color of the eastern forests (with one exception only, and that not too desirable, the Poison Oak, Rhus diversiloba), what immense resources trees from abroad are going to prepare to future landscape-artists in this privileged region! A mere intuition can be had at present with the shining silver of Leucodendron argenteum, the rich bronze of Croton tiglium, the coppery tints of Cedrela Dugesii, of Ficus princeps and F. Bengalensis, the rose-colored new growth of Aleurites Moluccana and of Bauhinia Vahlii, the brown velvet of Rhopala Corcovadensis and a host of others, which are gathering here from every corner of the world.

Santa Barbara, Calif. *F. Franceschi.*

American Plums.

To the Editor of Garden and Forest:

Sir,—The better varieties of American Plums in cultivation deserve more general recognition than has been heretofore accorded them. There are none of the varieties which can displace such standards of European parentage as Lombard, Bradshaw, Italian Prune and Damson, but many of them are worth growing in addition to the varieties named; and to the somewhat large class of growers with whom the European varieties are not a success, the Americana, Wild Goose and Chickasaw varieties are a valuable resource. Especially where fruit-trees are compelled to bear great inclemencies of climate the superior hardiness of American species will strongly commend them. In this section of Vermont all the varieties of the Domestica class have failed this year, only a very few well-protected Damsons and fewer Russians remaining to be excepted; but those growers here and there who have planted native varieties had heavy crops. In the orchard of Mr. L. M. Macomber, at North Ferrisburgh, I saw trees of Wolf, Wolf Seedlings, Minnesota, and also of Pottawottomie and Robinson loaded as heavily as they could possibly bear. Still larger quantities were grown by Mr. Holmes, at Shelburne, who shipped many crates to the Burlington market, where they retailed at $2.75 and $3 00 a bushel. With such prices as these, and with trees which bear as abundantly as most varieties of Prunus Americana, there could hardly be a more profitable orchard block. At Dr. Hoskins' place, which has become famous as a testing-ground for ironclads, I saw also trees of De Soto thoroughly loaded with fruit. I should say, however, that Dr. Hoskins has also several Russian varieties of Prunus domestica which bore this year.

It is somewhat interesting that Chickasaw varieties, which are of southern origin, should succeed so far north as Vermont. Some of the finest plums I have seen this year were of this species. I think, in general, the table qualities of the Chickasaws are superior to those of Americana varieties, although when properly cooked, canned, preserved or made into jelly, many of them are unquestionably palatable. I have seen no plums of the Wild Goose class in this section. My recollection dwells with considerable fondness upon the plums which we used to gather along the sand-hills of the Arkansas River in western Kansas, and which probably represent Professor Sargent's Prunus Watsoni. Many of these fruits were very superior, I am sure. They have been quite generally cultivated locally, and a very few varieties have been named and propagated. They have never been widely distributed, however, and most horticulturists would find them a decided novelty.

Those who would discourage the planting of native Plums present the argument that they are not good for table use, and that they are not salable. Neither statement is more than partly true. Any number of good judges will testify to their culinary excellence, while the record of sales given above is a sufficient answer to the second point.

Vermont Experiment Station. *F. A. Waugh.*

The Wild Flower Garden.

To the Editor of Garden and Forest:

Sir,—To a lover of wild flowers many of the cultivated forms generally found in small gardens lack something of that irresistible charm possessed by the best of their indigenous relatives, which, however, we rarely see in cultivation. There seems to be a strong desire to obtain new and rare plants from foreign countries for the sake of having that which is unusual and not possessed by every one. There is, however, a slight, though increasing, tendency on the part of our nurserymen and plant dealers to include in their lists many of our common Ferns, flowering plants, as well as many native shrubs and trees which were never propagated for sale a few years ago.

A corner, at least, of every garden should be devoted to hardy native herbaceous plants. No flower has a more delicate grace than the nodding wild Columbine. Though its native habitat is the rocky hilltop, in sun or partial shade, it will thrive equally well in the garden. I have seen it grow and flower profusely along the north side of a building scarcely ever reached by the sun. This season I chanced to come upon a fine plant of Rue Anemone while roaming over a rocky hill. The flowers were well opened, but I took it home and gave it a place in the garden, and for nearly two weeks it was a source of great delight, being a mass of continual bloom and very attractive.

The Bird-foot Violet, Viola pedata, thrives well in cultivation, where it is inclined to grow much larger than in its native habitat. It is usually found only upon dry and rocky elevations where there is little soil. This may, perhaps, account for its small size. In a rich garden soil, however, one would scarcely recognize it, though still beautiful. Both leaves and blossoms are much larger, the plant frequently growing to twice or three times its ordinary height, and it is very pretty when used as an edging or grown in masses.

Ferns may be transplanted successfully at any time during the season, though probably best done in late autumn or early spring. For shady situations very attractive borders may be formed with such as the Ostrich, Cinnamon, Sensitive, Christmas, Maiden-hair and Regal Ferns. Of these the Ostrich Fern is the largest and most conspicuous.

New Haven, Conn. *W. E. Britton.*

A Factory Garden.

To the Editor of Garden and Forest:

Sir,—There are not many instances in this country where the waste land adjoining a factory has been transformed into a park; usually the ground is most unattractive. An exception to this is found in the little village of Bay State, adjoining Northampton, where the proprietor of a large cutlery factory, W. W. Lee, Esq., has for several years maintained a tract of land some four or five acres in extent as a small public park. It is of easy access. A carriage-drive encircles the whole place. The open spaces are kept well mown, and large clumps of Arundos and other ornamental Grasses are used with good effect. But Mr. Lee's chief hobby is Water-lilies, and these he grows to the greatest perfection. One large circular pond is used for the tender Nymphæas. This pond is heated by a coil of steam pipes placed in the bottom of the pond, the steam being supplied from the factory. I never saw a finer specimen of the Victoria regia than the one he grew in this pond last year. A bed of tall-growing Cannas and Castor-oil Plants encircles this pond at a distance of ten feet, to form a wind-break, while between the bed and the pond are planted at intervals clumps of Bambusa Metake, Cyperus papyrus, Gunnera scabra and Colocasia Antiquorum.

Two other ponds are filled with hardy Lilies and Nelumbiums, one of which is situated at the bottom of a lovely dell, where flowers and Ferns grow in the greatest profusion and luxuriance. Beyond a little judicious thinning out no other attempt is made to improve this charming spot.

Mr. Lee has a unique device for keeping his Ferns and flowers moist on the banks skirting the dell. An ordinary water-pipe is laid along the top of the bank, which is perforated with holes ten inches apart, just allowing the water to trickle down the bank. The coal-sheds and other outbuildings are all screened off from view by a trellis some ten feet high, covered with Clematis paniculata, and a glorious sight this is when in flower, while the factory itself is covered with Ampelopsis Veitchi.

Two fine specimens of the Laurel-leaved Willow, planted from cuttings ten years ago, are now about twenty-five feet in height. This should be more extensively used, as it forms a well-shaped tree and its leaves are of a deep shining green, somewhat resembling a Portugal Laurel. Near the entrance to the factory are circular beds of some good herbaceous plants, each bed containing only one kind of plant. A bed of Chrysanthemum uliginosum was just coming into bloom, while another was gay with the scarlet flowers of Monarda didyma. This place is greatly appreciated, not only by the residents of the village, but by the citizens of Northampton, and, no doubt, it exerts a wholesome influence on the neighborhood.

Botanic Garden, Northampton, Mass. *Edward J. Canning.*

Dipladenias.

To the Editor of GARDEN AND FOREST:

Sir,—In the account of the Boston flower show in GARDEN AND FOREST for September 16th, the Dipladenias exhibited by me were spoken of as stove climbers, but the fact is that the two plants shown had been grown in a greenhouse for five years, where the temperature was not kept above fifty degrees, Fahrenheit, with fire-heat, while it often went down to forty degrees at night. Over a dozen of these plants have been grown out-of-doors in the garden here all summer, and I have never seen foliage on any Dipladenias under glass to compare with that of these plants to-day, September 20th, for size, substance or brilliancy of color. They are so glossy that one would think the leaves had been oiled.

Whitinsville, Mass. *George McWilliam.*

The Forest.

The Burma Teak Forests.—IX.

EXPERIMENTS IN PLANTING TEAK.

THERE was, however, no doubt in my mind from the outset that something more was wanted, and that it was not sufficient to protect and aid the Teak which had sprung up naturally, but that it would be necessary to increase the proportion of Teak in the forests by sowing and planting. Tectona grandis belongs to the family of Verbenaceæ; the ovary is four-celled, with one ovule in each cell, generally one or two only of these ovules develop into perfect seeds. The seeds are oily; they are enclosed in a nut with thick, extremely hard walls, and this nut is surrounded by a dense spongy mass consisting of innumerable forked hairs, and this mass again is enclosed in the enlarged and inflated bladder-like calyx. This remarkable structure of the Teak-seed had long attracted the attention of Burman foresters. The seed ripens early in the dry season, before the season of the annual fires sets in. My Burman friends declared that this was a wise adaptation of nature, that the seed must be roasted in the jungle fires in order to burst open its hard bony shell and to enable it to germinate. Others declared that it was quite impossible to raise Teak in plantations. Fortunately, however, Teak plantations had been established elsewhere—in Tava, at Nilambur, in Malabar, on the western coast of the peninsula, and in 1856 in Tenasserim before the forests of that province were added to my charge. The difficulties, therefore, which the foresters of Pegu had raised I put aside as imaginary, and when in June, 1857, I established my first experimental Teak plantation at Prome, on the banks of the Iraauddi River, I did not use fire to make the seeds germinate, but plenty of water, and in the exceedingly high temperature of May, up to 100 degrees, Fahrenheit, in the shade, this answered the purpose. At the time of germination the expanding embryo bursts open the hard shell, and a piece of the outer wall comes off bodily like a round concave cap. Teak seed, however, has this peculiarity, in common with the European Ash, Fraxinus excelsior, that the seed does not germinate evenly. The seedlings continue coming up successively for a considerable period, numerous seedlings not appearing until the second or third year, and a portion not germinating at all. This irregularity had possibly given rise to the opinion that Teak could not be raised artificially. Teak, like Oak, has a long tap-root when young; the root is soft, and seedlings are most sensitive to any injury to their roots. The best plan, therefore, is to raise seedlings in nurseries before the commencement of the rains, and early in the rains to plant them out when they are four to six weeks old.

PLANTATIONS MADE IN THE OPEN COUNTRY.

The Teak plantations succeeded well; the difficulty was the expense. The greatest outlay was the clearing of the dense tropical forest; another was to weed the ground after planting, so as to prevent the small Teak-plants being smothered by the luxuriant growth of weeds and coppice-shoots which, during the rains in this forcing tropical climate, spring up in profusion and smother the young Teak. Attempts were made to establish plantations on a large scale in the open country outside the forests, a plan at first sight excellent, because the open country is less feverish than the forests, labor consequently procurable at all seasons and much less expensive; because thinnings will sell and the mature timber raised in these plantations may be brought to market at less expense. The results, however, of these operations in the open country have not proved satisfactory. The growth of trees is the result of numerous factors, some of which are not yet fully understood. The market value of a Teak-tree, to a great extent, consists in the regular cylindrical shape of the log, which ought to be without knots and other irregularities. Teak-trees grown in gardens near Calcutta and in the open country of Burma invariably have fluted and irregularly shaped stems, and show a much greater tendency to crooked and irregular growth than trees grown up in the heart of the forests. Hence, plantations in the open country outside the forests have not been extended largely. Their area is sufficient to ascertain by actual experience whether by allowing the tree to grow up in dense compact masses and by careful thinnings, removing all spreading and otherwise badly shaped trees, Teak can be made to produce first-class timber in the comparatively dry air of the open country.

KAREN HILL CLEARINGS.

Hence, the question to be solved was to arrange planting work in the forests here, always to command the necessary labor and to reduce expense. This question was solved by raising Teak with the aid of field crops. The inhabitants of these forests mostly belong to different tribes of the Karen nation, mentioned in the first of these papers. In places they have in the valleys of these hills permanent gardens of Oranges, Mangoes and other fruit-trees, groves of the Betel Palm, Areca Catechu, and plantations of the Betel Vine, Piper Betle, all carefully watered by channels taken off from the mountain streams. The grain which they cultivate is Rice, and this, together with Pumpkins and other vegetables, as well as Cotton, they raise by a rude system of shifting cultivation. These Karens live under a patriarchal government in small villages, each village under a head man called Tookay. On the area fixed upon by the Tookay for this year's clearance the forest is cut down early in the dry season, in January or February. By that time the dew has ceased, every day the air gets drier and the sun more fierce. The tangled mass of Bamboos and branches gradually becomes dry like tinder; toward the end of the hot season, in April, it is fired, and the results are heaps of white ashes among the black-charred trunks and stumps of the larger trees which the fire has not consumed. After the first showers in May the paddy is sown in shallow holes made with a narrow spade. The heat is great, the rain copious and the Rice germinates rapidly. But weeds and the coppice-shoots of stumps not killed by the fire also profit by heat and moisture; they grow up with alarming luxuriance, and threaten to kill the young crop of Rice. Hence, all the women and children of the village in long rows are hard at work weeding the toungya, or hill-field, for thus it is called in Burma. Thus the bright emerald-green Rice-fields on the slopes of these hills, cleaned and kept clean by dint of enormous labor continued throughout the season, form a pleasing contrast to the varied, but darker, foliage of the surrounding forest. In October, and sometimes in September, breaks occur in the rains, the ears are formed, and the crop is harvested in December.

TOUNGYA TEAK PLANTATIONS.

As soon as I had seen the first Karen toungya in 1856, I determined to devise some method by which this mode of shifting cultivation might be utilized for planting Teak on a large scale in those regions where this species attains its most perfect development. A Burman forester, Moung Tsaudoon, who was in charge of the Raboung forest district, to whom I had explained my wishes, was the first to carry out the plan. On a subsequent visit, in 1868, I had the satisfaction to examine six small plantations made by him on toungyas in successive years, the oldest in 1856. On this small plantation, then twelve years old, the trees were from fifty-five to sixty feet high. Upon a really large scale toungya Teak plantations, however, were not established until many years later. It was Major (now Major General) Seaton, an officer in one of the Madras regiments, at that time stationed at Rangoon, whom I had, together with other military officers, engaged for service in the forests. In 1868, when he had gradually risen to be Conservator of Forests, and had succeeded in gaining the confidence of the Karens in several forest districts, he induced them to plant Teak with paddy on their hill clearings, certain rates being paid for each acre with a stipulated number of plants a year old. In 1880 an aggregate area of 2,515 acres had thus been planted up at a total cost of 24,932 rupees, or less than ten rupees an acre. Under these arrangements the clearing of the forest and the weeding of the plantation during the first year was accomplished at exceedingly moderate rates. The principle of planting Teak on the same area with field crops was adopted in the case of plantations made by means of hired labor, called regular plantations, in order to reduce the cost of these undertakings; nevertheless, the expense per

acre was always six to eight times that of toungya Teak plantations made by the Karens in the forests.

Bonn, Germany. *Dietrich Brandis.*

Notes.

The green fruits of Nasturtiums (Tropæolum), valued for pickling, now cost fifty cents a quart in our markets.

One of the most interesting exhibits at the Florists' Convention in Cleveland was a collection of hardy Phloxes shown by The Storrs Harrison Company, of Painesville, Ohio. During the past three or four years the improvement in these plants has been as great as in any other class of perennials, and now in variety, in the length of time through which they bloom, and in their varied and delicate beauty they leave very little to be desired.

The name of the donor of the new range of greenhouses recently completed for the Department of Botany of Smith College has up to the present not been announced. Last week, however, a bronze tablet placed at the entrance of the Palm-house bears this inscription: "The Lyman Plant House. A Memorial Tribute to Anne Jean Lyman, by her Son, Edward Hutchinson Robbins Lyman." It is a noble gift appropriately dedicated to a useful service.

A correspondent of *The Rural New Yorker* writes that the ordinary annual garden Coreopsis, or, as seedsmen call it, Calliopsis, makes an admirable window plant. In the early autumn seedlings come up abundantly where these plants are grown, and some thrifty ones are taken up, potted and kept in the ordinary way and brought in before frost. Under good conditions these plants will begin to flower in a sunny window about the middle of January and continue for many weeks.

At the first annual exhibition of the American Dahlia Society in Philadelphia last week there were more than five hundred vases on exhibition, many of them containing twenty-five blooms of the kind. Mr. W. P. Peacock, of Atco, New Jersey, the well-known specialist, received twelve first prizes; Mr. W. H. Maule received first prize for the best novelty, a pink flower called La France; and other large collections were shown by Mr. A. Blanc, W. Atlee Burpee and H. G. Faust and Cornell University, which sent a collection of 225 varieties.

In some notes on growing Radishes under glass in *American Gardening*, Professor B. T. Galloway states that in order to have all the roots attain marketable size at the same time it is essential to use only the larger seed. For this purpose the ordinary commercial seed is screened through a sieve made of a sheet of brass perforated with holes 8-10oths of an inch in diameter and placed about one-sixteenth of an inch apart. Less than two-thirds of the seed will remain in the sieve, but ninety per cent. of these will germinate and the entire crop will attain edible size at about the same time.

In connection with the horticultural display of the exhibition of the American Institute, which opened on Monday in Madison Square Garden, the Dahlia Society will hold a conference on October 6th, when Rev. C. W. Bolton and Lawrence K. Peacock, secretary of the society, will make addresses; on October 9th successful cultivators will give their experience in the growing of fruits; vacant-lot farming will be discussed by Mr. Kelgaard on the 13th, and there will be exhibits by the growers; on the 16th the subject of addresses will be the relation of woman to floriculture. These meetings will all be held in the reception room which adjoins Concert Hall, where the floral exhibition will be located.

The first chestnuts to reach this city in any considerable quantity came from the Alleghany Mountains, near Oakland, Maryland, a week ago, and sold at wholesale for $10.00 a bushel. Larger and better-colored chestnuts have since been received from the Wallkill Valley in this state, the first lots commanding $9.50, and later shipments $8.00 a bushel. The crop in West Virginia and Tennessee is said to be very heavy, and, indeed, Chestnut-trees are generally loaded with nuts, so that these high prices will not be maintained. The first hickory-nuts are now on their way to the wholesale merchants, and low prices are anticipated from the start on account of reports of a large supply. In some sections, however, as in northern New Jersey, for example, we have observed that the Hickories are bearing very few nuts.

As the days become cooler many plants in the herbaceous border which flower in early spring have the good habit of blooming through another period. Among the most noteworthy of these are the Globe-flowers, or Trollius, both T. Asiaticus and T. Europeus, which are now showing their beautiful orange and yellow flowers almost as profusely as they did in early spring. The sweet-scented and delicate Daphne Cneorum, a prostrate little shrub which does not like the hot weather of our summers, blooms a second time as soon as the nights become cool and the days short. Some of the Iceland and Alpine Poppies do the same thing, and they are beautiful at whatever season they are seen. These plants, like the hardy autumn flowers, will not turn black at the first frost, but will keep on blooming long after the Coleus, Alternanthera and other so-called bedding plants are entirely killed.

An unusual offering on last Saturday, for this time of year, was strawberries, said to be second-crop fruit, from southern New Jersey. These sold for $1.25 a quart. Huckleberries have been in continuous supply since the middle of May, when the first came from North Carolina; those now coming from the mountains of New York cost fifteen cents a quart. Large perfectly grown quinces may be had for $1.00 a half-bushel. Oranges, from Jamaica, are of fair quality for early fruit, and their tartness is quite acceptable after the rather insipid Mediterranean summer oranges. The main dependence for this fruit will be upon Jamaica during the next two months, since but little of the limited Florida crop will leave that state, and the early shipments from California are not due here before the middle of December. European hot-house grapes are now coming to this country from large commercial graperies near Liverpool, and are arriving in exceptionally good order.

A case at law of importance to buyers and sellers of Orchids was decided in August in a court of the city of London. The plaintiff bought at the auction sale of a well-known collector several choice and valuable species and varieties, some of which proved untrue to name and of little value, and not feeling disposed to stand by such a bargain, he made application that the high prices paid should be refunded. As the request was refused the plaintiff brought action to recover his rights. Two well-known experts testified that they had seen the plants in flower, and they were not true, and another bore witness that no variety of Orchid would alter its character by changing into another variety, and on this testimony the plaintiff received a verdict with costs. The Orchids in question were the white form of Cattleya Skinneri, which proved to be only the ordinary colored form; Odontoglossum × elegans, which turned out a pure form of O. Hallii, and Dendrobium × splendidissimum grandiflorum, said to be D. × Leechianum.

A correspondent of *The Country Gentleman*, after stating the well-known fact that farm products now sell for little more than the labor they cost, and that, therefore, the farmer cannot afford to pay another profit on anything that can be produced at home, inquires why so much that is bought at the village store is found on the farmer's table and so little of what he might raise on his own acres. Why, for example, should not ripe strawberries always be had in abundance in their season when they can be grown as cheaply as potatoes, bushel for bushel; and why should not raspberries be found with blackberries, grapes and all the choicer vegetables which are wholesome, and certainly cheaper than the canned goods which he buys so freely? The true reply is not that farmers are indolent and not that they lack the space, but that they do not know how to grow fruit and fine vegetables. If they would look upon the garden less in the light of a luxury, and esteem it as the most profitable portion of their farm, and then give as much thought and attention to it as they do to what seems larger affairs, there might be less complaints of hard times and ill health.

The demand for American hardwoods in Europe is growing, and oak leads the foreign shipments, although tulip poplar, ash, gum and black walnut, whenever a good quality can be secured, are in some demand. European consumers like the quality of American oak, and since it is known to be plentiful here it will probably be in increasing demand. Cottonwood has been shipped to Germany in considerable quantities, where cheap wood is required for furniture and other uses. Much of this lumber is forwarded from New Orleans, and since a great part of the oak, ash, poplar, cottonwood and other timbers demanded by the foreign market is in the southern states, it is not improbable that lumber for foreign markets will be largely shipped in future from the Gulf ports. In speaking of this matter *The Northwestern Lumberman* says that the European market requires lumber cut of exact thickness, and of accurate length, trimmed so as to have the butts square and true. Space for piling in the yards of the Old World is an object, so that random, uneven lengths are objectionable, and since the foreign buyer insists that he shall have just what he bargains for, quality should be strictly attended to.